DEP's Proposed Total Maximum Daily Loads (TMDL's) Strategy to Improve the Water Quality of Massachusetts Rivers and Lakes

Executive Summary

The Massachusetts DEP, in conjunction with EOEA, is developing and implementing the Massachusetts Watershed Initiative. This initiative provides a watershed approach to water quality management throughout the Commonwealth. It stresses working with community officials, industries, environmental groups, and citizens to jointly identify problems in a watershed and develop priorities and actions to address them.

Tremendous improvements have been made in the quality of rivers and lakes in Massachusetts over the last 20 years. These improvements are the result of successfully identifying and addressing "point sources" of pollution (e.g. direct discharges of sewage and industrial wastewater). However, significant problems still exist in many lakes and river segments, often as a result of "non-point" sources of pollution (e.g. stormwater runoff, landfill leachate). These waters are "impaired" in that they do not support their designated uses (e.g. swimming, fishing). Under Section 303(d) of the Federal Clean Water Act (CWA) states are required to develop a list of impaired waters and estimates of the maximum amount of pollution allowed where existing controls are not stringent enough to attain compliance with State Water Quality Standards. The CWA also mandates that states develop and adopt Total Maximum Daily Loads (TMDLs) for those waters affected by pollutants. The process of developing a TMDL involves the calculation of the allowable pollutant loading to a receiving water and the allocation of the allowable load to both point and non-point sources. Based upon the 1998 list of impaired waters in Massachusetts, approximately 1500 TMDLs will have to be developed. This number will fluctuate as water body segments are added and removed from the list. Clearly this will be a significant effort for many years to come. In the spring of 1998 EPA required that all states, including Massachusetts, submit a strategy and schedule to complete all the TMDLs within the next 8 to 13 years. The DEP, Division of Watershed Management, submitted both the strategy and a schedule for EPA approval on April 1, 1998.

DEP's strategy envisions a two- phase approach. The first phase, which will be completed during the first two years (by 2000), is intended to accomplish three primary objectives. First, it builds upon current information and studies previously conducted by concentrating on implementation of corrective actions where feasible. Second, it includes a pilot program in one watershed (Nashua) to better define data collection needs and TMDL development procedures for a number of specific pollutants of concern. Last, it provides a mechanism to work cooperatively with EPA Region 1 to develop and standardize methods for determining TMDLs for many pollutants where protocols are not yet well established. Once developed and agreed to by EPA these protocols will be used to develop TMDLs during the next two basin cycles.

The second phase will occur from the year 2000 to the year 2012 utilizing the watershed approach. The schedule was developed in recognition that there are two distinct categories of pollutants, those where DEP believes technical methods are fairly well established and those where they are not. DEP proposes to develop a large percentage of TMDLs in the first category during the first round of the watershed cycle (first 5 years). Also during that initial round DEP plans to work cooperatively with EPA to establish acceptable methods for those pollutants where either methods currently do not exist or where methods may be questionable. Once acceptable methods are identified and agreed upon with EPA those TMDLs will be developed during the second 5 year cycle.

A critical component of the strategy is to work closely with the watershed teams and other stakeholders to obtain public feedback on setting priorities for TMDL development within each watershed as well as on proposed strategies and implementation measures to address water quality impairments. This will be critical in particular to achieve reduction in pollutant loadings from non-point source pollution sources. Prioritization will be based upon the relative importance of the waterbody within the watershed, the constituent of concern (eg: pollutant) causing impairment, and the degree to which acceptable methods are available to define and achieve problem resolution. Public support and involvement is essential to achieve both existing and future water quality goals. The following is the complete text of DEP's proposed TMDL strategy that was submitted to EPA Region 1.

Introduction

Section 303(d) of the Clean Water Act (CWA) requires States to develop a prioritized list of waterbodies where existing controls on point and non-point sources of pollutants are not stringent enough to attain or maintain compliance with applicable State water quality standards. The CWA also mandates that states develop and adopt Total Maximum Daily Loads (TMDLs) for those waters affected by pollutants. The process of developing a TMDL involves the calculation of the allowable loading to a receiving water (the amount of pollutant loading that the water can receive without violating water quality standards) and the allocation of the allowable load to point sources, nonpoint sources and background, plus a margin of safety. Depending upon the nature and breadth of the impairments to a waterbody, one or more TMDLs are implemented under the authority granted to the Department of Environmental Protection (DEP). These actions may include both regulatory and voluntary actions as part of a larger Watershed Management Plan (WMP). Priorities for TMDL development in a particular watershed are also developed as part of the watershed management planning process. For some types of impairments, such as those caused by non-chemical stressors, (for example the transport of exotic plant species or flow alteration due to dam construction) the development of a TMDL is not appropriate because there is no pollutant to allocate. These types of impairments are better addressed through implementation measures incorporated into a comprehensive watershed management plan. Waterbodies that do not meet Water Quality Standards (WQS) due to non-compliance with discharge permits are also not appropriate for TMDL development according to Federal guidelines. Instead, a compliance and enforcement program would be the appropriate response.

For many impaired waters in Massachusetts, efforts to improve water quality and restore uses have been initiated in the absence of a formal TMDL. Since the early 1970s, the Commonwealth has taken regulatory action, calculated "waste load allocations," and approved facility plans for the construction of 138 Publicly Owned Treatment Works (POTWs). These actions have resulted in the dramatic reduction of conventional pollutants discharged from point sources to receiving waters which, when considering dry weather conditions, results in approximately 70% of the rivers now being considered fishable and swimmable in the Commonwealth. NPDES permits issued to many facilities located on impaired waters have included more restrictive limits than required by technology-based standards. Over the past several years, the Department has also undertaken a number of far-reaching and effective statewide controls in order to improve water quality, including:

- Water Management Act and New Source Approval regulations requiring delineation and protection of drinking water supplies;
- the Water Quality Certification program (under s. 401 of the Clean Water Act) which sets stringent limits on alteration of wetlands in or bordering Outstanding Resource Waters (most ACECs, all surface drinking water supplies and other designated water resources);
- linking funding under federal grants as well as the State Revolving Fund (SRF) loan program to priority water pollution problems in all 27 river basins of the state. This funding is essential for ensuring that any pollution control program, whether or not it is labeled "TMDL," is actually implemented. The SRF has the capacity to finance, at 0% interest, projects totaling $200 million/year;
- adopted stringent standards for subsurface disposal systems (Title 5);
- developed new regulations for implementation of the Rivers Protection Act;

- implemented new performance standards and Best Management Practices for State Stormwater Management.

These statewide regulatory controls, aimed at the state's most prevalent pollution sources (as identified in the State Summary of Water Quality Report, 305b), are only one component of the Massachusetts Clean Water Strategy and will go a long way towards meeting TMDLs.

Assessing the quality of the State's waters and identifying those which do not meet WQS is the first step towards developing an effective strategy to address water quality problems in each of the state's 27 river basins. In an effort to assess the State's waters on an on-going basis, the state has implemented a five year rotating basin monitoring and assessment strategy in which the basins will be evaluated on a rotating schedule resulting in approximately one-fifth of the state's watersheds being evaluated each year. The five year watershed schedule also includes provisions for the development of watershed teams comprised of both regulatory and non-regulatory stakeholders who would be responsible for conducting on-going outreach and the development of watershed management plans during year 4 of the 5 year cycle to address identified water quality problems. In a partnership with watershed community councils, "hot spots" are identified in the basin assessments, and actions are identified and implemented to address these problems. Integral to this approach is the public participation and outreach programs which will be used to obtain public input to help set priorities within each watershed and obtain public feedback and input into completed water quality assessments and TMDLs in the future. The state is confident that this strategy will enable us to obtain valuable input from the watershed stakeholders and better assimilate available data from other sources into the evaluation and assessment process.

Public input and feedback on setting priorities within each watershed as well as on proposed strategies and implementation measures to address water quality impairments is a central component of the State's approach to meeting its commitments of the Clean Water Act over the next decade. The Neponset River Pilot Project is a good example of how watershed plans can be used to most effectively implement the Clean Water Act. In that case, several pollution "hot spots" were identified in the assessment report and immediate actions were taken to control the pollution sources where they were clearly known. In order to meet the requirements of a TMDL, an action plan, included in the final Watershed Management Plan, must "allocate" a pollution load for each of the remaining contributing sources (the allocation may be equivalent to the water quality standards for that pollutant, plus a margin of safety) and then detail specific commitments (an MOU, an enforcement schedule, a bylaw or regulation or some other means) to demonstrate "reasonable assurance" that action will be taken. Thus, the Department is committed to utilizing the watershed approach and its basin plans as the most effective means of achieving pollution reduction. With a strengthening of its implementation plan and incorporation of those actions into the Watershed Management Plans, DEP anticipates it will satisfy the TMDL requirements.

However, EPA guidance has not yet been finalized on how the contents of a Watershed Management Plan can be shaped to serve the purposes of the state's TMDL responsibilities. DEP will work closely with EPA over the next two years to crystallize a firm understanding of how TMDL requirements can fit the structure of a Watershed Management Plan and what constitutes "reasonable assurance" that controls will be implemented. In the meantime, DEP must outline a program to begin developing over 1000 TMDLs required in conjunction with the 303(d) list using EPA-approved methods.

This document is intended to begin that process by outlining Massachusetts' proposed TMDL strategy during the next two years.

TMDL Strategy

A clear understanding of the causes of impairment is a critical element in the success of efforts to improve water quality conditions and restore designated uses to the waterbody. Development of TMDLs will be scheduled based upon the availability of data identifying the causes of non-attainment and the severity of the existing water quality problem.

The State of Massachusetts is committed to developing TMDLs for all impaired water bodies where TMDLs are needed by the year 2012. To achieve this goal, the Department must effectively allocate resources and rely on all watershed stakeholders to work in partnership. As previously noted, public input and feedback on setting priorities within each watershed as well as on proposed strategies and implementation measures to address water quality impairments is a central component of the State's approach to meeting its commitments of the Clean Water Act over the next decade. Given this, the Department is proposing to utilize the watershed teams to the maximum extent feasible during the 5 year watershed cycle to help prioritize listed waters for TMDL development. Prioritization will be based upon the relative importance of each water body within the watershed, the constituent of concern causing impairment, and the degree to which analytical methods are defined, accepted, and available to achieve problem resolution. The attached spreadsheet (attachment No. 1) provides an estimate of the percentage of TMDLs that will be developed by DEP for each watershed between the year 2000 and 2012 in accordance with the basin cycle. The schedule was developed in recognition that there are two distinct categories of pollutants, those in which DEP believes technical methods are well established for TMDL development (category A) and those which the methods are not well established and which will require further development (category B). A list of pollutants in each of these categories is provided in attachment No. 2. It can be seen when reviewing the spreadsheet that DEP is currently proposing, during the first round of the watershed cycle, to develop a large number of TMDLs for which known analytical protocols are established. Also during the initial years DEP plans to work cooperatively with EPA to establish acceptable methods for conducting TMDLs for those parameters where acceptable methods either currently do not exist or may be questionable. Once acceptable methods are identified and agreed upon with EPA those TMDLs will be developed during the second 5 year watershed cycle.

It should also be noted that as draft TMDLs are developed DEP plans to utilize the watershed teams to obtain stakeholder input on proposed implementation strategies for each TMDL and incorporation of those strategies into the overall watershed management plan for implementation.

The Department's proposed strategy during the next two years is intended to accomplish three primary objectives. First, it builds upon current information and studies previously conducted which qualify for submittal as a TMDL and therefore concentrates on implementation of corrective measures wherever feasible. Second, it includes a pilot program in one watershed to better define data collection needs and TMDL development procedures for a number of specific pollutants of concern. Last, it provides a mechanism to work cooperatively with EPA Region 1 to develop and standardize methods for determining TMDLs for several pollutants for which protocols are not well established. Once developed and agreed to by EPA these protocols will be used to develop TMDLs during the next two cycles of the five year basin schedule.

As previously stated the Department believes that for many impaired waters in Massachusetts, efforts to improve water quality and restore uses have already been initiated in the absence of a formal TMDL. As such these efforts meet the intent of the TMDL goals and objectives. Given this, implementation rather than re-evaluation is of primary importance. To address this issue DEP plans to review approximately 70 to 80 existing lake diagnostic/feasibility studies during the next two years which have been conducted for lakes on the state impaired waters list (303d). A list of those lakes identified for DEP review is attached (attachment No. 3). Following public review, these studies will be submitted to EPA for approval under the TMDL program. In addition, DEP plans to evaluate up to 20 past and present facility plans to determine if they were designed to address water quality limited segments identified on the 303d list. Some examples of activities include recent upgrades to a number of publicly owned treatment works to address nutrient loading and chlorine toxicity issues and bacterial contamination from combined sewer overflows and stormwater discharges. Examples of these plans include Cohasset, South Essex Sewage District, the MWRA CSO study, and the recently completed Blackstone River Initiative.

There are many different types of pollutants causing water quality violations in the Commonwealth. Development of TMDLs to address these pollutants can vary from a simplified dilution calculation to complex water quality modeling. In order to address these issues in a comprehensive and defensible manner it will be critical to work closely with EPA to identify data needs and to develop standardized protocols necessary for future TMDL development. To accomplish this goal DEP is proposing to conduct a pilot program on the Nashua River (in conjunction with EPA) to obtain data and define how TMDLs should be developed. It is hoped that up to eleven TMDLs can be developed for this basin during the next two years (3 pathogen TMDLs on river segments and 8 lake TMDLs).

Also, as previously noted, DEP plans to work cooperatively with EPA during the next two years to develop specific methods for determining TMDLs for all pollutants of concern listed on the state 303(d) list. DEP has categorized those pollutants into two categories, those in which we believe technical methods are considered well developed and need EPA confirmation of our methodology and those needing development and EPA agreement.

In addition to the above, DEP will continue to re-evaluate and strengthen the 303d list. During development of the 303(d) list for submittal to EPA in 1998, DEP recognized that many of the listed waters were either based on limited information or data. Although those segments have remained on the list DEP identified them as segments requiring additional evaluation to determine if they meet required criteria necessary for inclusion on future 303(d) lists.

Proposed Strategy for Types of Waterbodies

LAKES

Several different problems can affect a lake or pond. The most common are:

- culturally accelerated eutrophication (nutrients)
- nuisance aquatic vegetation (often related to nutrient overloads)
- exotic species (often but not always plant species or algae)

Nutrients**:** Most ponds and lakes in Massachusetts do not have direct wastewater discharges. Therefore, most of the nutrients enter in runoff and groundwater from the watershed; for some larger lakes, atmospheric loads may have to be considered. Internal recycling of nutrients in the waterbody must be considered as well.

Controls: Title 5 controls, stormwater controls, and informed land use are the major means of minimizing eutrophication beyond that which may occur naturally. These are primarily local issues in Massachusetts. The Commonwealth does own the larger lakes (Great Ponds) in the state, but neither owns nor controls their watersheds.

Implementation Strategy: The strategy is to educate the public to the types of problems and the regulations that do apply and the financial support that does exist. Stormwater performance standards should be applied by conservation commissions through the issuance of local Orders of Conditions under the state Wetlands Protection Act for existing or increased stormwater discharges. Existing discharges can be remediated through a DEP-designation process under the State's Clean Waters Act. Local Conservation Commissions, following both applicable state law and any specific local authorizations, play a primary role in protecting wetlands and thereby any associated open waterbodies as well. Local Boards of Health similarly are the first line of oversight in dealing with subsurface disposal of wastewater from private homes. In addition, the revisions to the State's regulations dealing with septic tanks (Title 5) places additional emphasis on siting requirements and maintenance of existing systems; this latter feature is captured in the inspection of a system required when a property is being sold or transferred. In addition, approved innovative and alternative systems are allowed and encouraged to remediate existing failed systems. All of these programs can be helped financially to some degree through specific aspects of the state's revolving fund (SRF) when done through a municipality. While these programs are state wide and continuous, special attention, such as targeted monitoring and enforcement, can and should be undertaken during the 5 year cycle for watershed planning and implementation based on public input and participation. Priority will be given to funding implementation projects in these watersheds during the appropriate part of the watershed planning and implementation cycle.

Exotic and Nuisance Plants:

Many lakes are afflicted with rampant plant growth. Some of these aquatic plants are native species which are fed by an overabundance of nutrients and some are non-native (exotic) species which have gained access to a waterbody and proliferated in the absence of natural controls.

Controls: Reduction of nutrients is the long-term control measure at least for the native species. But in some instances for native species and especially for non-native species, management of the waterbody is the only realistic option. Control measures include a wide range of tools that vary from physical, such as drawdown, to chemical herbicides so long as all controls meet state and federal requirements. Preventing the spread of non-native species is the single most effective control measure for exotic species.

State strategy and controls: The major effort here is to prevent the spread of such plants. While there are regulations governing the importation of foreign plants, many are already established in waterbodies throughout the Commonwealth; the prevention strategy for these plants lies in education and best management practices. Boaters in particular are urged to wash the hulls and clean the propellers of their boats before leaving a waterbody since most of these plants can be

ferried from one waterbody to another. A bill filed in the Legislature would strengthen enforcement of exotic weed transport. For those areas where nuisance and exotic plants are established, management techniques range from chemical controls to desiccation by lowering water levels during the winter. The Commonwealth has issued a review of lake restoration practices (Lakes GEIR) that serves as a guide for control measures.

COASTAL WATERS

The major issue for coastal waters is protection of water quality and habitat especially shellfish. In addition, there is concern that waterbodies with restricted circulation may be adversely impacted by nitrogen (N) loadings--more so from non-point sources given that most of these waterbodies typically do not receive direct wastewater discharges.

Bacteria: The most sensitive use of coastal waters is for shellfish since the highest bacterial quality is required for these areas to be open to the general public. A strong program of water quality monitoring of these areas is practiced by the Massachusetts Division of Marine Fisheries. Harvesting permits and resource management are the responsibility of the community in which the shellfish are located. The state is responsible for those resources in state waters. Because of the high quality of water required, stormwater, whether contaminated with wastewater or not, is a major cause of limiting the amount of open areas for general shellfishing. Wastewater effluents and especially combined sewer overflows have major effects on these resources in specific areas.

Implementation strategy: Having recognized these impacts, both wastewater discharges and CSO controls are aimed at minimizing the adverse impact on shellfish beds. As with other issues, controlling stormwater and non-point sources such as runoff from livestock operations is an even greater challenge since direct regulation of these sources is limited. Therefore, much of the control is based on voluntary programs that require outreach, education and, where appropriate, financial assistance.

Now that most, if not all, point sources and CSOs are being controlled or are part of an overall plan to improve water quality, the emphasis is shifting to efforts to manage non-point sources. These efforts will be maximized during the watershed cycle when a given coastal basin is in its implementation year.

Coastal monitoring must be strengthened and integrated with the Watershed Initiative's 5-year cycle so that data gaps can be filled, priority pollution sources targeted and enforcement actions, such as stormwater designations and continuing and widespread on-site disposal violations, can be remedied.

Nutrients**:** Nutrients, especially nitrogen, are a concern in coastal waters that have restricted circulation. Few, if any, of these waters in Massachusetts receive direct discharges. However, non-point source loadings, especially from subsurface wastewater disposal units in developed watersheds are a major source. While demonstrating that a waterbody may be adversely affected is not always easy, it is much simpler than predicting when a waterbody will reach a critical point. In the first instance, water quality data are required. Key parameters which may reflect stressed conditions include the loss of eel grass as well as diurnal fluctuations in dissolved oxygen. In the second instance, a predictive tool is required. While some have been suggested and generally involve estimating the annual nitrogen loading, there is no universally accepted tool; this is an area that needs additional development.

The Cape Cod Commission and Menzies Assoc. have secured federal funding, through DEP, to develop nitrogen-sensitive embayment delineation methodologies. Once an approved delineation and loading methods are adopted, Title 5 regulations provide for a mechanism to require stricter on-site wastewater controls through revised Title 5 and Water Quality Standards regulations.

Controls: Reducing and/or controlling N is the major means of avoiding or rectifying problems. While controls on runoff are helpful, the most important source seems to be from subsurface wastewater disposal units. This would also apply to point sources that affect any coastal waterbody identified as suffering from nutrient impacts.

Implementation strategy: Because much of the authority for controlling non-point sources is at the local level, the main strategy for the Commonwealth is to provide the regulatory framework, education, technical assistance, and, where authorized, financial assistance to abate non-point sources of pollution. Within the Commonwealth's regulations for subsurface disposal (known as Title 5), is the provision to designate a water body as being nitrogen sensitive. Under this designation, control of nitrogen is emphasized. Means of effecting this control include requiring subsurface disposal systems that denitrify their effluents. To date, no such areas have been designated. However, at least three towns do have some guidance for selected areas. Falmouth has town wide guidance for its coastal waters. Bourne and Plymouth have a program to manage N in the watershed of Buttermilk Bay.

In addition to Title 5, storm water regulations (federal) and guidance (state) also exist. Large cities (>100,000 population) and selected industries are subject to the federal regulations on a categorical basis. Other entities in these two groups can be subject if certain water quality impacts are caused by runoff from these facilities or urbanized areas. In general, agricultural activities in Massachusetts are exempt from direct regulation, but receive much attention through voluntary programs the most prominent of which is the Natural Resources Conservation Service, formerly known as the Soil Conservation Service.

Eelgrass bed maps have been completed for the entire coastline of Massachusetts and should be used to help target follow-up monitoring, enforcement, and remediation of pollution sources contributing to the decline of eelgrass beds and hence important shellfish species such as scallops. This will require integration of a coastal monitoring component into the watershed cycle.

RIVERS

Rivers are the waterbodies for which the largest number of TMDLs have been done. Pollutants limits were established for point source discharges mainly to deal with organic impacts caused from biochemical oxygen demand (BOD) and nitrogen oxygen demand (NOD). In addition, seasonal or year around disinfection is required in Massachusetts so that sanitary wastewaters meet the standard for bacterial indicator organisms. Ammonia has been limited beyond NOD in some cases to eliminate it as a toxicant.

While effluent limits for phosphorus have been set for many discharges, there remains no firm vehicle for determining an acceptable loading to a river particularly where impacts are due to macrophyte growth. Dilution calculations have been calculated for selected metals, but need to be re-evaluated since the standard was revised and is now based on dissolved rather than total recoverable metal as defined by EPA.

Controls: Both treatment and pollution reduction/prevention are major controls which need to be employed. Point source treatment levels are determined by the state in a regulatory framework while nonpoint pollution reduction/prevention is based on statewide controls and targeting in Watershed Management Plans for follow-up implementation, primarily at the local level**.**

Implementation strategy: The state has a primary role in setting water quality standards, establishing and allocating TMDLs and in determining treatment requirements for wastewater effluents. It also pursues education and technical assistance for both POTWs and commercial entities. Pollution prevention and reduction are major aspects for the latter. Training programs for wastewater treatment plant operators also is a major activity of the Commonwealth and is necessary to maximize and maintain treatment efficiency.

These point source traditional methods need to be seriously augmented by the wide range of nonpoint source and non-traditional controls such as those seen in the Neponset Watershed Pilot Project. Fixing leaking sewer pipes, removing illegal sanitary connections to stormwater discharges, erosion/sediment controls, 21E site designations, Title 5 enforcement, and Water Management Act permit modifications are all examples of the types of nonpoint source controls that can be and must be implemented to realize water quality gains that go beyond end-of-pipe technology-based command-and-control solutions.

PROPOSED METHODS AND ISSUES NEEDING RESOLUTION FOR CONSTITUENTS CITED ON THE STATE 303d LIST

It should be noted that according to PL 92-500, Section 303d, only constituents listed in accordance with Section 304a1 (Water Quality Criteria) and 304a2 (thermal) should be on the 303d list. The Department will review the 303d list using the current criteria and propose removing entries that do not meet these requirements. Segments may be added to the 303(d) list in accordance with watershed assessments in each of the 27 river basins.

One of the major tasks during the period 1998-2000 will be reaching consensus on TMDL protocols for all constituents. The following outlines some proposed approaches and identifies topics needing more detailed review so that protocols for all constituents can be established on a mutually agreed-upon basis.

Chlorine (6)--If DEP determines that effective dechlorination facilities are in place at those sources discharging chlorine, then these six segments will be removed from the 303(d) as a result of implementation measures being employed.

Metals (47)--Where metals are in ambient waters (36) (as opposed to fish tissue (11)), DEP will recommend listing these segments for additional confirmation since the standards now include dissolved metals rather than total metals which was the basis for the original listing. Only those waterbodies that violate the specific form of the metal in the standards should remain on the 303d list. Additional data collection however could be problematic since the methodology for data collection has changed. Clean sample collection and analytical techniques are now paramount to proper data collection andn listing decisions. The lack of clean techniques in the past have made previous listing decisions for metals questionable at best.

The current program of instituting BMPs, including corrosion reduction in water supplies, aimed at reducing the concentration of metals in wastewaters and biosolids should continue vigorously. DEP will propose a project with USGS to measure total and dissolved concentrations of selected metals in effluents and receiving waters as the first step to assess if the newly promulgated criteria are being met. Locations will be selected based on current criteria exceedances based on total concentration.

For fish tissue, mercury [Hg] is the primary metal of concern. In lakes, mercury comes from natural weathering, perhaps aggravated by acid rain, and air fallout deposition. To address this issue, in terms of a TMDL, air pollution control strategies need to be considered and national policy needs to be set.

Exotic species (149)--DEP will remove from the 303d list those segments (primarily lakes) that are not applicable or consistent with the definition of PL 92 500 Section 304a(1) nor (2). A continuing educational program on weed transport is an appropriate response. Water bodies will remain on the list where exotic species are thought to be associated with nutrient enrichment as well. If subsequent monitoring shows de-listed water bodies are in fact appropriate for listing they will be proposed for re-listing.

Noxious plants (282)- Waterbodies that have been identified as having an overabundance of noxious plants will be treated as a nutrient problem. In general, noxious plants will be considered an indication of over enrichment with nutrients. As such, waterbodies identified as being impaired with such plants will be evaluated for nutrient (primarily phosphorus) loading. For those lakes in which a diagnostic/feasiblility study has been performed the proposed approach will be to move towards implementation rather than re-evaluation. The technical approach will estimate nutrient (usually P) loads using land use models and impacts based on an appropriate metric (probably the trophic staus) to generate an estimate of the acceptable total maximum daily load. For the remaining lakes, which are the bulk that are on the 303d list, TMDLs will be achieved through the combined efforts of Title 5, the DEM lakes program, the new guidance for controlling stormwater, and voluntary fertilizer/pesticide reductions and other public awareness campaigns.

Nutrients (136)-- Nutrient evaluations for lakes (62) will be conducted as noted above. Where nutrients have been identified in river segments (74) as a cause of impairment a similar approach will be used as to the lakes approach however a different target or goal will be needed (e.g., P concentration, maximum diurnal DO changes). In general, a phased TMDL will be conducted which may consist of the incorporation of the highest and best practical treatment for point sources and best management practices (BMPs) for non-point sources. A monitoring program will be an integral part of the process so that the need for more controls can be evaluated.

Organic matter/low DO (128)--In general stream models will be used for determining the appropriate loading in rivers (79) but lake segments (39) will be treated as a nutrient problem as outlined above. .

Pathogens 139)--Pathogen related segments will be identified and corrected through the use sanitary surveys, the watershed assessment process and consultation with local Boards of Health officials. When necessary, enforcement action will be taken to correct problems.

pH (26)--These 26 segments need to be re-monitored to ensure that initial designations were correct if valid identification of the source will be needed. Where point sources are identified as the primary cause corrective actions will be employed through the use of enforcement action where appropriate. For non-point sources the likely source will be acid precipitation. EPA guidance and assistance will be necessary on how best to evaluate, resolve, and implement corrective actions since many potential sources may be beyond the states regulatory boundaries.

Priority organics (35)-- A case-by-case evaluation will be necessary depending on exactly which chemical is being cited as the cause for impairment. Re-confirmation of many segments on the list will be necessary since many of these segments were originally listed based upon old data.

Suspended solids (22)--The best approach for suspended solids control will be the identification and application of BMPs for control of non-point source erosion/runoff and the incorporation of stricter permit limits for point source controls (mostly the former).

Heat (1)--Will be evaluated on a case-by-case basis.

Toxicity (11)--Prior to proposing a control plan there will be a need to determine cause and type of toxicity causing impairment. Since these data is older the original basis for the listing needs to be reviewed.

Pesticides (4)--Need to review for specific pesticide and review status (ban vs. restricted use).

Flow (7)--Need to check the reason for the original designation and assess potential methods of control.

Turbidity (61)--If inorganic, implementation of erosion/stormwater control should be assessed. If organic, the proposed approach will be to treat it as nutrient problem unless know erosion/stormwater problems exist.

Siltation (18)--Erosion/runoff control is the appropriate response.

Ammonia-Nitrogen (3)--Usually caused by point sources. Additional treatment of the point source will be necessary to solve the problem.

Salt (3)--Implementation of BMPs is best response.

Oil and Grease (7)--There is a need to check the basis of the original listing and institute stormwater controls if appropriate.

Inorganics (1)--Will be evaluated on a case-by case, need to review original designation.

Non Priority chemicals (1)--Will be evaluated on a case-by-case basis; need to review original designation.

Taste and Odor (5)--Need to check the reason for the original designation.

Habitat (1)--Need to check original designation. May be flow-related.

Pathogens only (129)--same as pathogens above.

Finally, in accordance with the provisions of Section 303(d) of the CWA, the Commonwealth's TMDL strategy was adopted following a public comment period which ended on March 30, 1998.

ATTACHMENT NO. 1

PERCENTAGE OF TMDLs DEVELOPED BY CATEGORY

WATERSHED	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
NASHUA, BLACKSTONE CHICOPEE, CONNECTICUT	A- 50%					A- 50% B- 25%					B- 75%		
FRENCH, QUINEBAUG, MERRIMACK, PARKER, BOSTON HARBOR, MT. HOPE BAY, CAPE COD, NARRAGANSETT		A- 50%					A- 50% B-25%					B- 75%	
DEERFIELD, MILLERS, IPSWICH, SHAWSHEEN, BUZZARDS BAR, ISLANDS			A- 50%					A- 50% B- 25%					B- 75%
WESTFIELD, CONCORD FARMINGTON, TAUNTON SOUTH COASTAL				A- 50% B- 25%					A- 50% B- 75%				
HUDSON, HOUSATONIC, CHARLES, TEN MILE NORTH COASTAL					A- 50% B- 25%					A- 50% B- 75%			

ATTACHMENT NO. 2

Category A: Technical Methods Considered Well Developed [1]

1. Pathogens (Bacteria) only
2. Chlorine
3. Excessive Non-Native Plants (exotic species also associated with nutrient enrichment)
4. Excessive Native Plants (nutrient enrichment)
5. Nitrogen & Phosphorus for Lakes
6. Unionized Ammonia

Category B: Technical Methods Needing Further Development/Refinement

1. pH
2. Priority organics
3. Suspended Solids & Dissolved Solids
4. Thermal Impacts
5. Toxicity of Unknown Origin
6. Pesticides
7. Turbidity
8. Silt
9. Oil & Grease
10. Inorganic chemicals including metals
11. non-priority organics
12. Taste and Odors
13. Nutrients in River System
14. Nitrogen and Phosphorus in coastal waters

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[1] The majority of TMDLs required are for constitutes listed in category A.

ATTACHMENT #3

CLEAN LAKES

PROGRAM PROJECTS

APPEARING

ON THE

303(d)

LIST

DEPARTMENT OF ENVINROMENTAL PROTECTION

DIVISION OF WATERSHED MANAGEMENT

1998

APPEARING ON 303(d) LIST
1998
Page 2

WATERSHED	LAKE/POND	D/F REPORT	DATE	IMPLEMENTATION REPORT	DATE
HOOSIC	NONE				
HOUSATONIC	Lake Buel: Monterey/New Marlborough			Harvester Purchase and Design of Outlet Control EIR: Seasonal Drawdown and Harvesting	1983 No Report Found 1989
	Onota Lake: Pittsfield	Yes	1991		
	Prospect Lake: Egremond	Yes	1991		
	Stockbridge Bowl: Stockbridge	Yes	1991		
CONNECTICUT	Arcadia Lake: Belchertown	Yes	1985	Septic System Management	1989
	Forge Pond: Granby	Yes	1989		
	Metacomet Lake: Belchertown	Yes	1985	Septic System Management	1989
	Nashawannuck Pond: Easthampton	Yes	1986		
	Watershops Pond: Springfield	Yes	1986		
MILLERS	Kendall Pond: Gardner	Yes	1989		
CHICOPEE	Dimmock Pond: Springfield	Yes	1988		
	Hardwick Pond: Hardwick	Yes	1993	Flow Control	1989
	Quaboag Pond: Brookfield	Yes	1986	Phase II Report Seepage Report	1994
	Quacumquasit Pond: Brookfield/Sturbridge	Yes	1986		1994
	Upper Van Horn Park: Springfield	Yes	1990		

CLEAN LAKES PROGRAM PROJECTS

APPEARING ON 303(d) LIST
1998
Page 3

WATERSHED	LAKE/POND	D/F REPORT	DATE	IMPLEMENTATION REPORT	DATE
QUINEBAUG	Big Alum Pond: Sturbridge	Yes	1985		
	Cedar Pond: Sturbridge	Yes	1983		
	Hamilton Reservoir: Holland	Yes	1983		
	Prindle Lake: Charlton	Yes	1990		
	Walker Pond: Sturbridge	Yes	1985	Dredging Project	1990
FRENCH	Webster Lake: Webster	In-House Study		Septic System Management	1988
BLACKSTONE	Indian Lake: Worcester	Yes	1989		
	Leesville Pond: Auburn/Worcester	Yes	1990		
	Lake Quinsigamond: Worcester	Yes	Several In-House and 1981	Several: Stormwater Modelling, Etc.	1972; 1981; 1982; 1989
	Lake Ripple: Grafton	Yes	1986		
	Hovey Pond: Grafton	Yes	1979		
	Salisbury Pond: Worcester	Yes	1987		
	North Pond: Hopkington/Milford	Yes	1987		
	Flint Pond: Shrewsbury/Grafton/Worcester	In-House		Watershed Management Plan	1982
	Stetson Pond: Pembroke	Yes	1993		
TAUNTON					

CLEAN LAKES PROGRAM PROJECTS
APPEARING ON 303(d) LIST
1998
Page 4

WATERSHED	LAKE/POND	D/F REPORT	DATE	IMPLEMENTATION REPORT	DATE
MYSTIC	Ell Pond: Melrose	Yes	1985	Storm Drain Project	1989
	Spy Pond: Arlington	In-House Diag.			
		Feasibility	1982		
	Wedge Pond: Winchester	Yes	1988		
	Blacks Nook: Cambridge	Yes	1987		
CHARLES	Box Pond: Bellingham	Yes	1990		
	Bullough's Pond: Newton	Yes	1990		
	Halls Pond: Brookline	Yes	1986		
	Hardy's Pond: Waltham	Yes	1986	Final EIR for the Restoration of Hardy Pond	1996
	Jenning's Pond: Natick	Yes	1986		
	Lake Winthrop: Holliston	Yes	1985		
NEPONSET	Lake Massapoag: Sharon	Yes (two of them)	1984 & 1987		
WEYMOUTH AND WEIR	Foundry Pond: Hingham	Yes	1992		
	Lake Holbrook: Holbrook	Yes Final Draft Final	1989 1994		
NASHUA	Bare Hill Pond: Harvard	Yes	1987		
	Harbor Pond: Townsend	Yes	1988		
	Lake Shirley: Lunenburg	Yes	1988		
CONCORD	Bartlett Pond: Northborough	Yes	1986		

CLEAN LAKES PROGRAM PROJECTS
APPEARING ON 303(d) LIST
1998
Page 5

WATERSHED	LAKE/POND	D/F REPORT	DATE	IMPLEMENTATION REPORT	DATE
CONCORD (Continued)	Boons Pond: Hudson/Stow	Yes	1986		
	Chauncy Lake: Westborough	Yes	1986		
	Lake Cochituate: Framingham/ Natuck/ Wayland	Yes, but not under CLP	1980		
	Dudley Pond: Wayland	Yes	1983	Stormwater Renovation and Harvesting	On-Going as of 1987-1988 (Final Report?)
	Fort Meadow Reservoir: Marlborough	Yes	1987 Revised 1988		
	Long Pond: Littleton	Yes	1991		
	Fawn Lake: Bedford	Yes	1989		
SHAWSHEEN	Forest Lake: Methuen	Yes	1990		
MERRIMACK	Forge Pond: Westford/Littleton	Yes	1987		
	Mill Pond: West Newbury	Yes	1988		
	Knop's Pond (Lost Lake): Groton	Yes	1992		
	NONE				
	NONE				
PARKER	Browns Pond: Peabody	Yes	1989		
IPSWICH	Chebacco Lake: Hamilton/ Essex	Yes	1985		
NORTH COASTAL					

CLEAN LAKES PROGRAM PROJECTS
APPEARING ON 303(d) LIST
1998
Page 6

WATERSHED	LAKE/POND	D/F REPORT	DATE	IMPLEMENTATION REPORT	DATE
NORTH COASTAL (Continued)	Flax Pond: Lynn	Yes for Sluice and Flax Pond	1986		
	Floating Bridge Pond: Lynn	Yes	1986		
	Lake Quannapowitt: Wakefield	Yes	1986		
	Sluice Pond: Lynn	Yes	1986		
SOUTH COASTAL	Billington Sea: Plymouth	Yes (Includes Furnace, Little Sandy Bottom and Stetson Ponds)	1990		
	Furnace Pond: Pembroke		1993		
	Oldham Pond: Pembroke	Yes (Includes Furnace, Little Sandy Bottom and Stetson Ponds)	1993		
BUZZARDS BAY	Buttonwood Park Pond: New Bedford	Yes	1988		
CAPE COD	Bearse Pond: Barnstable	Yes (Includes Wequaquet and Long Ponds)	1989		
	Great Pond: Eastham	Yes	1987	Implementation for Ground Water and Aquatic Plants	1991
	Herring Pond: Eastham	Yes	1991		
	Red Lily Pond: Barnstable	Yes	1987	Wastewater and Drainage Disposal Analysis	1989
	Shallow Pond: Barnstable	Yes	1991		
	Sheep Pond: Brewster		1993		